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STATE'S TESTING PROCEDURES  
FOR DETECTING THE REDUCTION  
IN GASOLINE OCTANE RATINGS

MAY 1974

# Joint Legislative Audit Committee

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May 17, 1974

The Honorable President of the Senate  
The Honorable Speaker of the Assembly  
The Honorable Members of the Senate and the  
Assembly of the Legislature of California

### Members:

Transmitted herewith is the Auditor General's report pertaining to the state's testing procedures concerning gasoline octane ratings. The octane rating is an indicator of the antiknock quality of gasoline. Generally, gasoline with high octane ratings can be expected to produce better engine performance under more severe operating conditions. The Division of Measurement Standards of the State Department of Food and Agriculture is responsible for testing octane ratings.

No federal agency maintains testing facilities to determine octane ratings for gasoline sold to the public in California. The federal government has relied exclusively on the state's testing program. However until recently, the Division of Measurement Standards has not been equipped to perform the two separate testing methods specified by the American Society for Testing and Materials and required by the State Business and Professions Code, the Federal Cost of Living Council and the Federal Energy Office. Performance of both tests by the state began April 1, 1974.

Inadequate state procedures for selecting gasoline test samples have made it difficult to determine where octane reduction occurs and to identify those responsible for the reductions.

Based on the current number of tests performed annually, it would take 19 years to complete one cycle of testing each retail service station to determine the octane index number of gasoline. A

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disproportionately high percentage of the tests being performed are of independent retail stations, with little emphasis on testing at points in the distribution system (pipeline terminals and bulk plants) and no tests at refineries.

The adoption of a statistically valid sampling plan would enable determination of whether the responsibility for octane reductions rests with the retailer, the refiner, or someone in between.

The Auditor General has recommended that the Division of Measurement Standards develop a statistically valid plan for selecting gasoline test samples in order to determine where octane reductions occur and in order to pinpoint responsibility for such reductions.

Presently, the state octane posting requirement is conditional on Federal Trade Commission regulations, whose implementation has been delayed by court action. The Federal Energy Office also has octane posting requirements, but does not have facilities for the testing. FEO officials say this lack of facilities may bring about an end to the requirements. Since there are no industrywide standards of minimum octane levels for the various grades of gasoline, such as regular, premium, and super premium, motorists have no assurance that the same grade of gasoline purchased under different brand names will have similar operating characteristics. Continued posting of octane ratings on gasoline pumps would provide motorists a means of comparing the value of various products available.

The Auditor General has recommended that the Legislature amend the Business and Professions code in order that the octane posting requirement be mandatory on the basis of state law.

Respectfully submitted,



VINCENT THOMAS, Chairman  
Joint Legislative Audit Committee

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SUMMARY OF FINDINGS  
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FINDING

INADEQUATE STATE PROCEDURES FOR SELECTING GASOLINE TEST SAMPLES HAVE MADE IT DIFFICULT TO DETERMINE WHERE OCTANE REDUCTIONS OCCUR AND TO IDENTIFY THOSE RESPONSIBLE FOR THE REDUCTIONS

6

RECOMMENDATION

We recommend that the Department of Food and Agriculture's Division of Measurement Standards develop a statistically valid plan for selecting gasoline test samples to enable determining where octane reductions occur and identifying those responsible for the reductions.

8

FINDING

THE STATE OCTANE POSTING REQUIREMENT IS CONDITIONAL ON FEDERAL REGULATIONS

9

RECOMMENDATION

We recommend that the Legislature, to provide consumer protection, amend the Business and Professions Code to eliminate the conditional status of the octane posting requirement, and make the posting mandatory on the basis of state law.

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INTRODUCTION

In response to a legislative request, we have reviewed the procedures for monitoring gasoline octane ratings and detection of the reduction of octane for gasoline sold to the public.

The octane number, or rating, is an indicator of the anti-knock quality of gasoline. Generally, gasoline with higher octane ratings can be expected to produce better engine performance under more severe operating conditions.

Our review was limited to an examination of the state's octane testing program, but did include interviews with federal regulatory officials.

Responsibility for testing the octane ratings has been placed in the Department of Food and Agriculture's Division of Measurement Standards. The northern testing laboratory is in Sacramento and the southern laboratory is in Downey.

INFORMATION REQUESTED BY THE LEGISLATURE

The required octane posting provisions of the Federal Cost of Living Council's Phase IV Petroleum Regulations have been continued in the 1974 Federal Energy Office's Petroleum Allocation and Price Regulations. However, neither agency has had a program to collect samples for testing to determine if actual octane characteristics are in agreement with the posted rating.

In fact, no federal agency maintains facilities for testing octane characteristics of gasoline sold to the public in California. Instead, the federal government has relied exclusively on the state's testing program.

Since issuance by the American Society for Testing and Materials (ASTM) in 1937, various refinements have been made in the standard specifications for testing of gasoline octane characteristics. Specifications issued in 1968 designated two separate methods of octane testing, but the 1971 specifications require that equal weight be given to both of these tests to establish an octane index.

Regulations of the Cost of Living Council and the Federal Energy Office and Section 20709 of the Business and Professions Code of the State of California require that tests be performed in accordance with the latest published standards of the ASTM.

However, until recently, neither of the test laboratories of the state's Division of Measurement Standards have been equipped to perform both tests adopted by the ASTM. Following are the major differences between the two tests:

- Research Method - This test measures actual antiknock performance under mild operating conditions at low engine speed and temperature. Test results are generally four to eight points higher than the motor method, defined below, and two to four points higher than the index which results from the averaging of the two test scores. This is the single method which has been used by the state test laboratories.
  
- Motor Method - This test measures performance under more severe operating conditions with higher engine speed and temperature, and is more representative of the conditions when antiknock characteristics are most critical, such as acceleration and steep incline ascension.

Installation of the motor method test equipment in Sacramento, which became operational on April 1, 1974, now enables the performance of both tests by the state for the first time. The Downey testing laboratory has been out of operation for several weeks while motor method testing equipment is installed. It is expected to become operational about mid-May 1974.

Upon completion of the Downey improvements, all state tests should be in compliance with the statutory requirement and the federal regulations, and in agreement with the methods adopted by the ASTM to establish the posted octane index number.

FINDINGS

INADEQUATE STATE PROCEDURES FOR SELECTING  
GASOLINE TEST SAMPLES HAVE MADE IT  
DIFFICULT TO DETERMINE WHERE OCTANE  
REDUCTIONS OCCUR AND TO IDENTIFY THOSE  
RESPONSIBLE FOR THE REDUCTIONS

Over half of the retail service stations are inspected by Division of Measurement Standards' representatives each year; however, gasoline samples for octane testing are taken at only a small percentage of the stations inspected. Almost one-quarter of the state tests of gasoline are of samples submitted by local governments which, according to state laboratory personnel, result primarily from investigation of consumer complaints. Based on the current number of tests performed each year on samples taken during regular state inspections, it would take 19 years to complete one cycle of testing each station once for the octane index number for gasoline.

A disproportionately high percentage of the octane tests are of retail stations, with particular emphasis on independent stations, compared to the low number of tests at points in the distribution system (pipeline terminals, bulk plants, etc.) and no tests at all at refineries. The following tabulation summarizes, by source, the tests completed by the Sacramento laboratory during the five months ended March 31, 1974.

<u>Source</u>	<u>Number Of Tests</u>
Retail - major brand stations	227
Retail - independent stations	296
Pipeline terminals	6
Bulk plants - aviation fuel	4
Refineries	<u>0</u>
Total	<u><u>533</u></u>

The complete lack of refinery testing and the low number of tests within the distribution system make it extremely difficult to identify octane reductions and changes occurring at these points. This limited testing program also fosters an assumption that retailers are responsible for all reduced octane ratings.

The decision regarding which stations to take samples from for octane testing is left to the discretion of the individual inspectors. This absence of a sampling plan only permits identification of octane reductions to specific test samples; it precludes projecting test results to indicate general conditions or whether specific oil companies may be responsible for the reduction rather than individual dealers.

The adoption of a statistically valid sampling plan would enable determination of whether responsibility for octane reductions rests with the retailer, the refiner, or someone in-between.

RECOMMENDATION

We recommend that the Department of Food and Agriculture's Division of Measurement Standards develop a statistically valid plan for selecting gasoline test samples to enable determining where octane reductions occur and identifying those responsible for the reductions.

THE STATE OCTANE POSTING REQUIREMENT IS  
CONDITIONAL ON FEDERAL REGULATIONS

Legislation enacted in 1971 (Stats. 1971; Ch. 711) requires the posting of octane ratings. This legislation, however, was made conditional upon the adoption of regulations by the Federal Trade Commission (FTC) to require such posting (Stats. 1971; Ch. 711; Sec. 5). The FTC had adopted regulations to be effective March 15, 1972, but these regulations have been delayed by court action. Therefore, there is no effective California requirement that octane ratings be posted.

Other federal agencies, first the Cost of Living Council and then the Federal Energy Office, have issued regulations requiring octane posting. Federal officials stated that it is possible that the Federal Energy Office, which does not have facilities for octane testing, will discontinue the posting regulations. If these regulations are terminated, the posting requirements in California will be contingent upon the disposition of the Federal Trade Commission's regulations.

The Division of Measurement Standards' officials stated that there are no industry-wide standards of minimum octane levels for the various grades of gasoline, such as regular, premium, and super premium. Thus, motorists have no assurance that the same grade of gasoline purchased under different brand names will have similar operating characteristics.

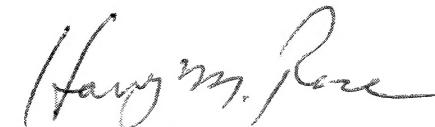
Continued posting of octane ratings on gasoline pumps would provide motorists a means of comparing the value of the various products available.

RECOMMENDATION

We recommend that the Legislature, to provide consumer protection, amend the Business and Professions Code to eliminate the conditional status of the octane posting requirement, and make the posting mandatory on the basis of state law.

SUMMARY OF COMMENTS OF THE CHIEF,  
DIVISION OF MEASUREMENT STANDARDS

1. The division intends to reevaluate the policy on testing gasoline octane ratings at the refinery level.
2. Legislation is needed that would amend the Business and Professions Code to eliminate the conditional status of the octane posting requirement, and make the posting mandatory on the basis of state law.
3. The existing sampling procedures (professional judgment of an inspector) adequately evaluate the octane rating of gasoline sold in the state on an industrywide and statewide basis. However, a statistically valid sampling plan, on a trial basis, to substantiate the division's findings on the existing system would be acceptable.



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May 14, 1974

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